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(71)Applicant : **KUBOTA CORP**

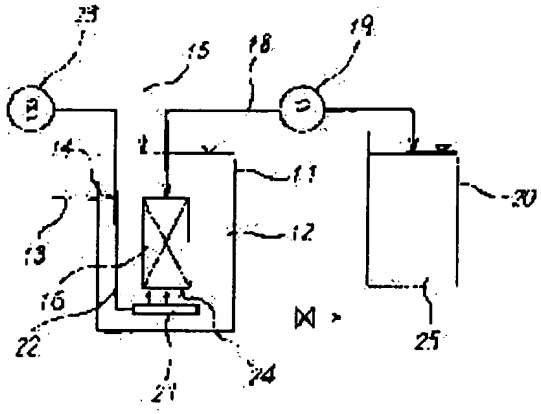
(72)Inventor : **SHIROYAMA HISAHARU**
KOIKE MITSUO

(54) ACTIVATED CARBON ADSORBING APPARATUS

(57)Abstract:

PURPOSE: To improve the adsorption rate and adsorption capacity and keep adsorption efficiency for a long duration by providing an adsorption tank to store a mixed slurry, a supplying pipe of water to be treated, a membrane separation unit, a sucking pump, an air bubbling pipe, and a blower communicating with the air bubbling pipe.

CONSTITUTION: Regarding an activated carbon adsorbing apparatus, air 24 is supplied to an air bubbling pipe 21 by a blower 23 to carry out aeration of a mixed slurry consisting of water to be treated 14 and activated carbon powder 15 stored in the inside of an adsorption tank 11. Uprising stirring current generated by the air lifting function of the aerating air 24 ascends the mutual gaps of membrane modules and thus circulating current is generated in the tank 11 wherein the current consists of upward current flowing upward from down side in the inside of a membrane separation unit 16 and downward current flowing downward from upper side in the outside of the membrane separation unit 16. While the mixed slurry 12 in the adsorption tank 11 whirls by circulating current, COD of the water to be treated 14 is removed and water is decolored by adsorption by the activated carbon powder 15.



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(71)出願人　000001052
株式会社クボタ
大阪府大阪市浪速区敷津東一丁目２番47号

(72)発明者　城山　久治
東京都中央区日本橋室町３丁目３番２号
株式会社クボタ東京本社内

(72)発明者　小池　三男
東京都中央区日本橋室町３丁目３番２号
株式会社クボタ東京本社内

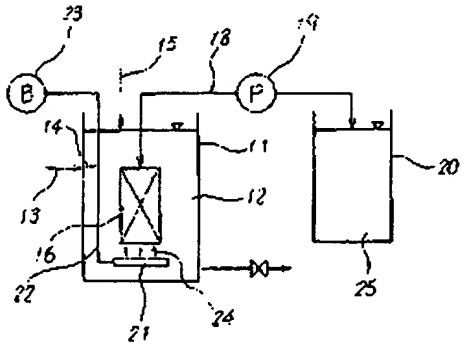
(74)代理人　弁理士　森本　義弘

(54)【発明の名称】　活性炭吸着装置

(57)【要約】

【構成】　被処理水１４と粉末活性炭１５との混合スラリー１２を貯留する吸着槽１１と、吸着槽１１に浸漬して設けた膜分離ユニット１６と、膜分離ユニット１６に連通する吸引管１８に介装した吸引ポンプ１９と、吸着槽１１の底部側に配設した散気管２１と、散気管２１に送気管２２を介して連通するブロアー２３とを設けた。

【効果】　膜分離ユニットにより粉末活性炭を濾過して粉末活性炭の槽外へ流出を阻止することにより粉末活性炭を吸着槽内に確実に保持できるので、粉末活性炭の使用が可能となり、吸着速度および吸着容量の向上を図れる。また、活性炭の吸着能を最大限に有効利用することができ、吸着効率を長期にわたって維持することができる。



11…吸着槽
12…混合スラリー
14…被処理水
15…粉末活性炭
16…膜分離ユニット
18…吸引管
19…吸引ポンプ
20…処理水槽
21…散気管
22…送気管
23…ブロアー
24…空気
25…処理水

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【特許請求の範囲】

【請求項１】　被処理水と粉末活性炭との混合スラリーを貯留する吸着槽と、吸着槽に被処理水を供給する供給管と、吸着槽に浸漬して設けた膜分離ユニットと、膜分離ユニットに連通する吸引管に介装した吸引ポンプと、吸着槽の底部側に配設した散気管と、散気管に送気管を介して連通するブロアーとを備えたことを特徴とする活性炭吸着装置。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は、粉末状の活性炭を用いて水処理を行う活性炭吸着装置に関する。

【０００２】

【従来の技術】従来、水処理において被処理水中のＣＯＤ、色度等を除去するために、例えば、図３に示すような活性炭吸着装置を用いていた。図３の構成においては、吸着槽１の上部に開口する供給管２から被処理水３を槽内に供給し、被処理水３を槽内に設けた活性炭層４を通して流下させており、活性炭層４を通過する際に被処理水３中のＣＯＤ，色度等を活性炭層２に充填した粒状活性炭により吸着処理していた。そして、活性炭層４を通過した被処理水５を槽底部に開口する排出管６を通して取り出していた。

【０００３】

【発明が解決しようとする課題】一般に活性炭はその粒子径が小さいほど吸着速度や吸着容量が向上することが知られており、粉末活性炭の使用が望ましい。しかし、上記した従来の構成においては、活性炭層４で保持可能な粒子径には限界があり、活性炭層４に粉末活性炭を充填した場合には、処理水５とともに粉末活性炭が槽外に流出して短期間に吸着効率が低下する問題があった。このため、従来の構成においては、粒状活性炭を使用せざるを得ず、処理能力を引き上げるためには、活性炭層４の容積を増大するとともに、吸着槽１を大型化する必要があり、用地の確保や費用の点から問題があった。

【０００４】本発明は上記課題を解決するもので、吸着槽内に粉末活性炭を投入し、粉末活性炭の槽外への流出を阻止しながら水処理を行うことができる活性炭吸着装置を提供することを目的とする。

【０００５】

【課題を解決するための手段】上記課題を解決するために、本発明の活性炭吸着装置は、被処理水と粉末活性炭との混合スラリーを貯留する吸着槽と、吸着槽に被処理水を供給する供給管と、吸着槽に浸漬して設けた膜分離ユニットと、膜分離ユニットに連通する吸引管に介装した吸引ポンプと、吸着槽の底部側に配設した散気管と、散気管に送気管を介して連通するブロアーとを備えた構成としたものである。

【０００６】

【作用】上記した構成により、ブロアーにより送気管を

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通して散気管に空気を供給し、散気管から吸着槽内の混合スラリー中に空気を曝気する。曝気した空気のエアリフト作用により生起する上昇攪拌流によって吸着槽内の混合スラリーを旋回させながら粉末活性炭によって被処理水中のＣＯＤや色度を吸着除去する。

【０００７】一方、供給管から被処理水を連続的に吸着槽内に供給しながら、膜分離ユニットにより混合スラリーを固液分離し、限外膜を透過した透過液を処理水として吸引管を通して吸引ポンプで取り出す。このとき、膜面に付着した粉末活性炭は槽内の上昇攪拌流により剥離させ、再び混合スラリー中に混入させる。

【０００８】したがって、吸着槽内の粉末活性炭を濃縮することにより、粉末活性炭の槽外への流出を阻止して処理水だけを槽外へ取り出すことができるので、粉末活性炭の使用によって吸着速度および吸着容量の向上が図れるとともに、活性炭の吸着能を最大限に有効利用することができ、吸着効率を長期にわたって維持することができる。

【０００９】

【実施例】以下、本発明の一実施例を図面に基づいて説明する。図１から図２において、吸着槽１１の内部には混合スラリー１２を貯留しており、混合スラリー１２は供給管１３から供給する被処理水１４と別途に吸着槽１に投入した粉末活性炭１５との混合物である。

【００１０】吸着槽１１の内部には膜分離ユニット１６を浸漬しており、膜分離ユニット１６は限外濾過膜等の膜を有する複数の膜モジュール１７を膜面間に適当間隙をおいて上下方向に平行に配置したものである。また、各膜モジュール１７の透過液流路は吸引管１８に連通しており、吸引管１８は途中に介装した吸引ポンプ１９を介して処理水槽２０に連通している。

【００１１】吸着槽１１の底部には膜分離ユニット１６の下方に位置して散気管２１を配置しており、散気管２１には送気管２２を介してブロアー２３を接続している。以下、上記構成における作用を説明する。ブロアー２３により送気管２２を通して散気管２１に空気２４を供給し、散気管２１から吸着槽１１の内部に滞留する混合スラリー１２中に空気２４を曝気する。曝気した空気２４のエアリフト作用により生起する上昇攪拌流は、膜モジュール１７の相互の間隙を上昇し、膜分離ユニット１６の内部を下方から上方に向けて流れる上向流と膜分離ユニット１６の外部を上方から下方に向けて流れる下向流とからなる循環流を槽内に作り出す。この循環流によって吸着槽１１内の混合スラリー１２を旋回させながら粉末活性炭１５によって被処理水１４中のＣＯＤや色度を吸着除去する。

【００１２】一方、供給管１３から被処理水１４を連続的に吸着槽１１内に供給しながら、膜分離ユニット１６により混合スラリー１２を固液分離する。そして、膜分離ユニット１６の濾過膜を透過した透過液を処理水２５

として吸引管１８を通して吸引ポンプ１９で取り出し、処理水槽２０に貯留する。また、各濾過膜モジュール１７の膜面に付着した粉末活性炭１５は膜モジュール１７の相互の間隙を流れる上昇攪拌流により剥離させ、再び混合スラリー１２中に混入させる。

【００１３】槽内の粉末活性炭１５が疲弊して吸着能が低下した場合には、吸着槽１１内の混合スラリー１２を抜取り、新しい粉末活性炭１５を投入する。したがって、吸着槽１１内の粉末活性炭１５を膜分離ユニット１６で濾過することにより、粉末活性炭１５の槽外への流出を阻止して粉末活性炭１５を槽内に確実に保持する状態で、処理水２５だけを槽外へ取り出すことができるので、粉末活性炭１５を使用して吸着速度および吸着容量の向上を図れるとともに、装置のコンパクト化を図ることができる。また、粉末活性炭１５の吸着能を最大限に有効利用することができ、吸着効率を長期にわたって維持することができ、活性炭使用量の削減によってランニングコストを低減することができる。

【００１４】

【発明の効果】以上述べたように本発明によれば、膜分離ユニットにより粉末活性炭を濾過して粉末活性炭の槽外へ流出を阻止することにより、処理水だけを槽外へ取り出して粉末活性炭を吸着槽内に確実に保持できるので、粉末活性炭の使用が可能となり、吸着速度および吸＊

＊着容量の向上を図れる。また、活性炭の吸着能を最大限に有効利用することができ、吸着効率を長期にわたって維持することができる。

【図面の簡単な説明】

【図１】本発明の一実施例における活性炭吸着装置の全体断面図である。

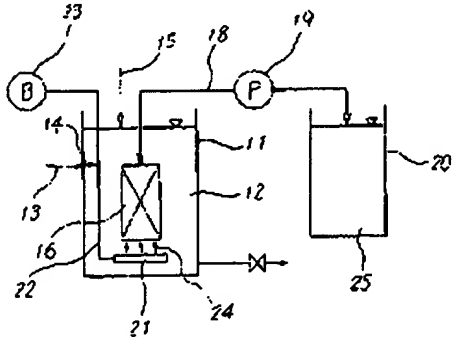
【図２】同実施例における膜分離ユニットの断面図である。

【図３】従来の活性炭吸着装置の断面図である。

【符号の説明】

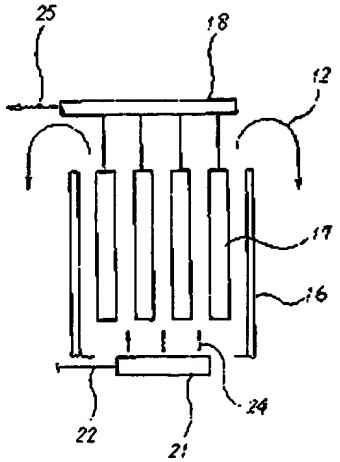
１１　吸着槽
１２　混合スラリー
１４　被処理水
１５　粉末活性炭
１６　膜分離ユニット
１８　吸引管
１９　吸引ポンプ
２０　処理水槽
２１　散気管
２２　送気管
２３　ブロアー
２４　空気
２５　処理水

【図１】

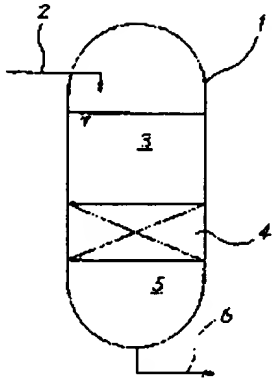


11---吸着槽
12---混合スラリー
14---被処理水
15---粉末活性炭
16---膜分離ユニット
18---吸引管
19---吸引ポンプ
20---処理水槽
21---散気管
22---送気管
23---ブロアー
24---空気
25---処理水

【図２】



【図３】



CLAIMS

[Claim(s)]
[Claim 1] Activated-charcoal-absorption equipment characterized by having the adsorption tub which stores the mixed slurry of processed water and powdered activated carbon, the supply pipe which supplies processed water to an adsorption tub, the membrane-separation unit immersed and prepared in the adsorption tub, the suction pump infixed in the siphon which is open for free passage to a membrane-separation unit, the powder trachea arranged in the pars-basilaris-ossis-occipitalis side of an adsorption tub, and the blower which is open for free passage through an airpipe to a powder trachea.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the activated-charcoal-absorption equipment which performs water treatment using powder-like activated carbon.
[0002]
[Description of the Prior Art] Activated-charcoal-absorption equipment as shown in drawing 3 in order to remove processed underwater COD, a chromaticity, etc. in water treatment conventionally for example, was used. In the configuration of drawing 3 , processed water 3 was supplied in the tub from the supply pipe 2 which carries out opening to the upper part of the adsorption tub 1, and when making it flow down through the activated carbon layer 4 which formed processed water 3 in the tub and passing the activated carbon layer 4, adsorption treatment was carried out with the granular active carbon which filled up the activated carbon layer 2 with COD in processed water 3, the chromaticity, etc. And the processed water 5 which passed the activated carbon layer 4 was taken out through the exhaust pipe 6 which carries out opening to the bottom of the tank section.
[0003]
[Problem(s) to be Solved by the Invention] Generally, it is known that a rate of adsorption and adsorption capacity will improve, so that the particle diameter is small, and the activity of powdered activated carbon of activated carbon is desirable. However, in the above-mentioned conventional configuration, when there was a limitation in the particle diameter which can be held in the activated carbon layer 4 and the activated carbon layer 4 was filled up with powdered activated carbon, there was a problem to which powdered activated carbon flows out out of a tub, and adsorption effectiveness falls for a short period of time with treated water 5. for this reason, the conventional configuration -- setting -- granular active carbon -- not using it -- in order not to obtain but to pull up a throughput, while increasing the volume of the activated carbon layer 4, the adsorption tub 1 needed to be enlarged and there was a problem from reservation of a site, or the point of costs.
[0004] This invention solves the above-mentioned technical problem, and powdered activated carbon is thrown in in an adsorption tub, and it aims at offering the activated-charcoal-absorption equipment which can perform water treatment, preventing runoff out of the tub of powdered activated carbon.
[0005]
[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the activated-charcoal-absorption equipment of this invention The adsorption tub which stores the mixed slurry of processed water and powdered activated carbon, and the supply pipe which supplies processed water to an adsorption tub, It considers as the configuration equipped with the membrane-separation unit immersed and prepared in the adsorption tub, the suction pump infixed in the siphon which is open for free passage to a membrane-separation unit, the powder trachea arranged in the pars-basilaris-ossis-occipitalis side of an adsorption tub, and the blower which is open for free passage through an airpipe to a powder trachea.
[0006]
[Function] By the above-mentioned configuration, air is supplied to a powder trachea through an airpipe by the blower, and aeration of the air is carried out into the mixed slurry in an adsorption tub from a powder trachea. Adsorption treatment of processed underwater COD and a chromaticity is carried out with powdered activated carbon, making it circle in the mixed slurry in an adsorption tub by the lifting stirring style which

occurs according to the airlift operation of air which carried out aeration.
[0007] On the other hand, supplying processed water in an adsorption tub continuously from a supply pipe, solid liquid separation of the mixed slurry is carried out with a membrane-separation unit, and it takes out with a suction pump through the siphon by using as treated water the transparency liquid which penetrated the filtration membrane. The powdered activated carbon adhering to a film surface is made to exfoliate by the lifting stirring style in a tub, and is made to mix into a mixed slurry again at this time.
[0008] Therefore, since it can ** if runoff out of the tub of powdered activated carbon is prevented and only treated water is taken out out of a tub by filtering the powdered activated carbon in an adsorption tub, while being able to aim at improvement in a rate of adsorption and adsorption capacity by the activity of powdered activated carbon, the adsorption capacity of activated carbon can be used effectively for the maximum, and adsorption effectiveness can be maintained over a long period of time.
[0009]
[Example] Hereafter, one example of this invention is explained based on a drawing. In drawing 2 , the mixed slurry 12 is stored in the interior of the adsorption tub 11 from drawing 1 , and the mixed slurry 12 is the mixture of the processed water 14 supplied from a supply pipe 13, and the powdered activated carbon 15 separately thrown into the adsorption tub 1.
[0010] The membrane-separation unit 16 is immersed in the interior of the adsorption tub 11, between film surfaces, two or more membrane modules 17 which have film, such as ultrafiltration membrane, are set, and the membrane-separation unit 16 arranges a suitable gap for them to parallel in the vertical direction. Moreover, the transparency liquid flow channel of each membrane module 17 is open for free passage to the siphon 18, and the siphon 18 is open for free passage to the treated water tub 20 through the suction pump 19 infixed on the way.
[0011] It was located in the pars basilaris ossis occipitalis of the adsorption tub 11 under the membrane-separation unit 16, the powder trachea 21 is arranged, and the blower 23 is connected to the powder trachea 21 through an airpipe 22. Hereafter, the operation in the above-mentioned configuration is explained. Air 24 is supplied to the powder trachea 21 through an airpipe 22 by the blower 23, and aeration of the air 24 is carried out into the mixed slurry 12 which piles up in the interior of the adsorption tub 11 from the powder trachea 21. The lifting stirring style which occurs according to the airlift operation of air 24 which carried out aeration goes up the mutual gap of a membrane module 17, and makes in a tub the circulating flow which consists of a bottom counterflow which turns caudad the exterior of a counterflow when turning the interior of the membrane-separation unit 16 to the upper part from a lower part and flowing, and the membrane-separation unit 16 from the upper part, and flows. Adsorption treatment of COD and the chromaticity in processed water 14 is carried out with powdered activated carbon 15, making it circle in the mixed slurry 12 in the adsorption tub 11 by this circulating flow.
[0012] On the other hand, solid liquid separation of the mixed slurry 12 is carried out with the membrane-separation unit 16, supplying processed water 14 in the adsorption tub 11 continuously from a supply pipe 13. And it stores in ejection and the treated water tub 20 with a suction pump 19 through the siphon 18 by using as treated water 25 the transparency liquid which penetrated the filtration membrane of the membrane-separation unit 16. Moreover, the powdered activated carbon 15 adhering to the film surface of each filtration membrane module 17 makes the mutual gap of a membrane module 17 exfoliate by the flowing lifting stirring style, and is made to mix into the mixed slurry 12 again.
[0013] When the powdered activated carbon 15 in a tub is exhausted and adsorption capacity falls, the mixed slurry 12 in the adsorption tub 11 is sampled, and new powdered activated carbon 15 is thrown in. Therefore, miniaturization of equipment can be attained while being able to aim at improvement in a rate of adsorption and adsorption capacity using powdered activated carbon 15 in the condition of preventing runoff out of the tub of powdered activated carbon 15, and holding powdered activated carbon 15 certainly in a tub by filtering the powdered activated carbon 15 in the adsorption tub 11 in the membrane-separation unit 16, since it can ** if only treated water 25 is taken out out of a tub. Moreover, the adsorption capacity of powdered activated carbon 15 can be used effectively for the maximum, adsorption effectiveness can be maintained over a long period of time, and a running cost can be reduced by the cutback of the amount of the activated carbon used.
[0014]
[Effect of the Invention] Since according to this invention only treated water is taken out out of a tub and

powdered activated carbon can be certainly held in an adsorption tub by filtering powdered activated carbon with a membrane-separation unit, and preventing runoff out of the tub of powdered activated carbon as stated above, it becomes usable [powdered activated carbon] and improvement in a rate of adsorption and adsorption capacity can be aimed at. Moreover, the adsorption capacity of activated carbon can be used effectively for the maximum, and adsorption effectiveness can be maintained over a long period of time.

[Translation done.]

TECHNICAL FIELD

[Industrial Application] This invention relates to the activated-charcoal-absorption equipment which performs water treatment using powder-like activated carbon.

[Translation done.]

PRIOR ART

[Description of the Prior Art] Activated-charcoal-absorption equipment as shown in drawing 3 in order to remove processed underwater COD, a chromaticity, etc. in water treatment conventionally for example, was used. In the configuration of drawing 3 , processed water 3 was supplied in the tub from the supply pipe 2 which carries out opening to the upper part of the adsorption tub 1, and when making it flow down through the activated carbon layer 4 which formed processed water 3 in the tub and passing the activated carbon layer 4, adsorption treatment was carried out with the granular active carbon which filled up the activated carbon layer 2 with COD in processed water 3, the chromaticity, etc. And the processed water 5 which passed the activated carbon layer 4 was taken out through the exhaust pipe 6 which carries out opening to the bottom of the tank section.

[Translation done.]

EFFECT OF THE INVENTION

[Effect of the Invention] Since according to this invention only treated water is taken out out of a tub and powdered activated carbon can be certainly held in an adsorption tub by filtering powdered activated carbon with a membrane-separation unit, and preventing runoff out of the tub of powdered activated carbon as stated above, it becomes usable [powdered activated carbon] and improvement in a rate of adsorption and adsorption capacity can be aimed at. Moreover, the adsorption capacity of activated carbon can be used effectively for the maximum, and adsorption effectiveness can be maintained over a long period of time.

[Translation done.]

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] Generally, it is known that a rate of adsorption and adsorption capacity will improve, so that the particle diameter is small, and the activity of powdered activated carbon of activated carbon is desirable. However, in the above-mentioned conventional configuration, when there was a limitation in the particle diameter which can be held in the activated carbon layer 4 and the activated carbon layer 4 was filled up with powdered activated carbon, there was a problem to which powdered activated carbon flows out out of a tub, and adsorption effectiveness falls for a short period of time with treated water 5. for this reason, the conventional configuration -- setting -- granular active carbon -- not using it -- in order not to obtain but to pull up a throughput, while increasing the volume of the activated carbon layer 4, the adsorption tub 1 needed to be enlarged and there was a problem from reservation of a site, or the point of costs.
[0004] This invention solves the above-mentioned technical problem, and powdered activated carbon is thrown in in an adsorption tub, and it aims at offering the activated-charcoal-absorption equipment which can perform water treatment, preventing runoff out of the tub of powdered activated carbon.

[Translation done.]

MEANS

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the activated-charcoal-absorption equipment of this invention is characterized by providing the following. The adsorption tub which stores the mixed slurry of processed water and powdered activated carbon The supply pipe which supplies processed water to an adsorption tub The membrane-separation unit immersed and prepared in the adsorption tub The blower which is open for free passage through an airpipe to the suction pump infixed in the siphon which is open for free passage to a membrane-separation unit, the powder trachea arranged in the pars-basilaris-ossis-occipitalis side of an adsorption tub, and a powder trachea

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[Translation done.]

OPERATION

[Function] By the above-mentioned configuration, air is supplied to a powder trachea through an airpipe by the blower, and aeration of the air is carried out into the mixed slurry in an adsorption tub from a powder trachea. Adsorption treatment of processed underwater COD and a chromaticity is carried out with powdered activated carbon, making it circle in the mixed slurry in an adsorption tub by the lifting stirring style which occurs according to the airlift operation of air which carried out aeration.
[0007] On the other hand, supplying processed water in an adsorption tub continuously from a supply pipe, solid liquid separation of the mixed slurry is carried out with a membrane-separation unit, and it takes out with a suction pump through the siphon by using as treated water the transparency liquid which penetrated the filtration membrane. The powdered activated carbon adhering to a film surface is made to exfoliate by the lifting stirring style in a tub, and is made to mix into a mixed slurry again at this time.
[0008] Therefore, since it can ** if runoff out of the tub of powdered activated carbon is prevented and only treated water is taken out out of a tub by filtering the powdered activated carbon in an adsorption tub, while being able to aim at improvement in a rate of adsorption and adsorption capacity by the activity of powdered activated carbon, the adsorption capacity of activated carbon can be used effectively for the maximum, and adsorption effectiveness can be maintained over a long period of time.

[Translation done.]

EXAMPLE

[Example] Hereafter, one example of this invention is explained based on a drawing. In drawing 2 , the mixed slurry 12 is stored in the interior of the adsorption tub 11 from drawing 1 , and the mixed slurry 12 is the mixture of the processed water 14 supplied from a supply pipe 13, and the powdered activated carbon 15 separately thrown into the adsorption tub 1.

[0010] The membrane-separation unit 16 is immersed in the interior of the adsorption tub 11, between film surfaces, two or more membrane modules 17 which have film, such as ultrafiltration membrane, are set, and the membrane-separation unit 16 arranges a suitable gap for them to parallel in the vertical direction. Moreover, the transparency liquid flow channel of each membrane module 17 is open for free passage to the siphon 18, and the siphon 18 is open for free passage to the treated water tub 20 through the suction pump 19 infixed on the way.

[0011] It was located in the pars basilaris ossis occipitalis of the adsorption tub 11 under the membrane-separation unit 16, the powder trachea 21 is arranged, and the blower 23 is connected to the powder trachea 21 through an airpipe 22. Hereafter, the operation in the above-mentioned configuration is explained. Air 24 is supplied to the powder trachea 21 through an airpipe 22 by the blower 23, and aeration of the air 24 is carried out into the mixed slurry 12 which piles up in the interior of the adsorption tub 11 from the powder trachea 21. The lifting stirring style which occurs according to the airlift operation of air 24 which carried out aeration goes up the mutual gap of a membrane module 17, and makes in a tub the circulating flow which consists of a bottom counterflow which turns caudad the exterior of a counterflow when turning the interior of the membrane-separation unit 16 to the upper part from a lower part and flowing, and the membrane-separation unit 16 from the upper part, and flows. Adsorption treatment of COD and the chromaticity in processed water 14 is carried out with powdered activated carbon 15, making it circle in the mixed slurry 12 in the adsorption tub 11 by this circulating flow.

[0012] On the other hand, solid liquid separation of the mixed slurry 12 is carried out with the membrane-separation unit 16, supplying processed water 14 in the adsorption tub 11 continuously from a supply pipe 13. And it stores in ejection and the treated water tub 20 with a suction pump 19 through the siphon 18 by using as treated water 25 the transparency liquid which penetrated the filtration membrane of the membrane-separation unit 16. Moreover, the powdered activated carbon 15 adhering to the film surface of each filtration membrane module 17 makes the mutual gap of a membrane module 17 exfoliate by the flowing lifting stirring style, and is made to mix into the mixed slurry 12 again.

[0013] When the powdered activated carbon 15 in a tub is exhausted and adsorption capacity falls, the mixed slurry 12 in the adsorption tub 11 is sampled, and new powdered activated carbon 15 is thrown in. Therefore, miniaturization of equipment can be attained while being able to aim at improvement in a rate of adsorption and adsorption capacity using powdered activated carbon 15 in the condition of preventing runoff out of the tub of powdered activated carbon 15, and holding powdered activated carbon 15 certainly in a tub by filtering the powdered activated carbon 15 in the adsorption tub 11 in the membrane-separation unit 16, since it can ** if only treated water 25 is taken out out of a tub. Moreover, the adsorption capacity of powdered activated carbon 15 can be used effectively for the maximum, adsorption effectiveness can be maintained over a long period of time, and a running cost can be reduced by the cutback of the amount of the activated carbon used.

[Translation done.]

DESCRIPTION OF DRAWINGS

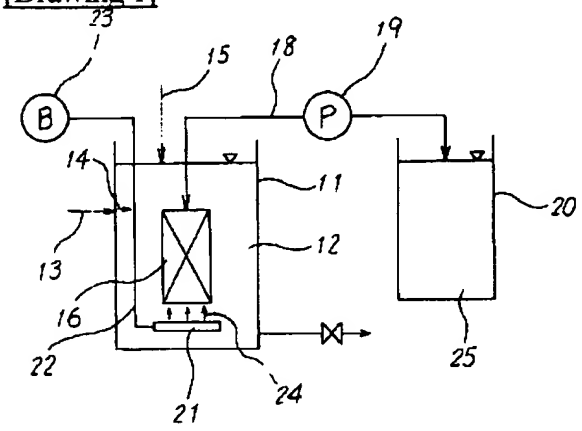
[Brief Description of the Drawings]
[Drawing 1] It is the whole activated-charcoal-absorption equipment sectional view in one example of this invention.
[Drawing 2] It is the sectional view of the membrane-separation unit in this example.
[Drawing 3] It is the sectional view of conventional activated-charcoal-absorption equipment.
[Description of Notations]
11 Adsorption Tub
12 Mixed Slurry
14 Processed Water
15 Powdered Activated Carbon
16 Membrane-Separation Unit
18 Siphon
19 Suction Pump
20 Treated Water Tub
21 Powder Trachea
22 Airpipe
23 Blower
24 Air
25 Treated Water

[Translation done.]

* NOTICES *

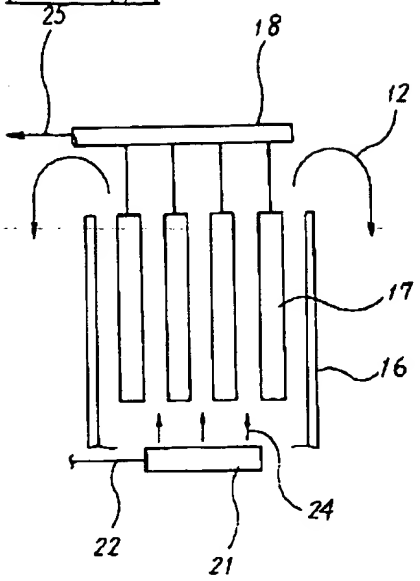
DRAWINGS

[Drawing 1]

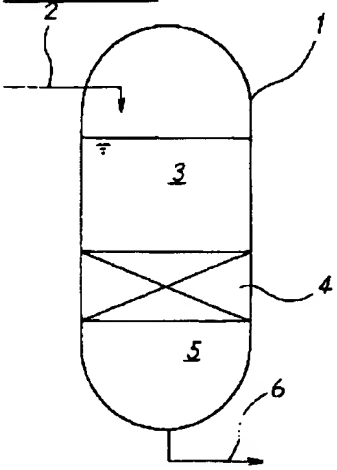


11---吸着槽
12---混合スラリー
14---被処理水
15---粉末活性炭
16---膜分離ユニット
18---吸引管
19---吸引ポンプ
20---処理水槽
21---散気管
22---送気管
23---ブロアー
24---空気
25---処理水

[Drawing 2]



[Drawing 3]



[Translation done.]